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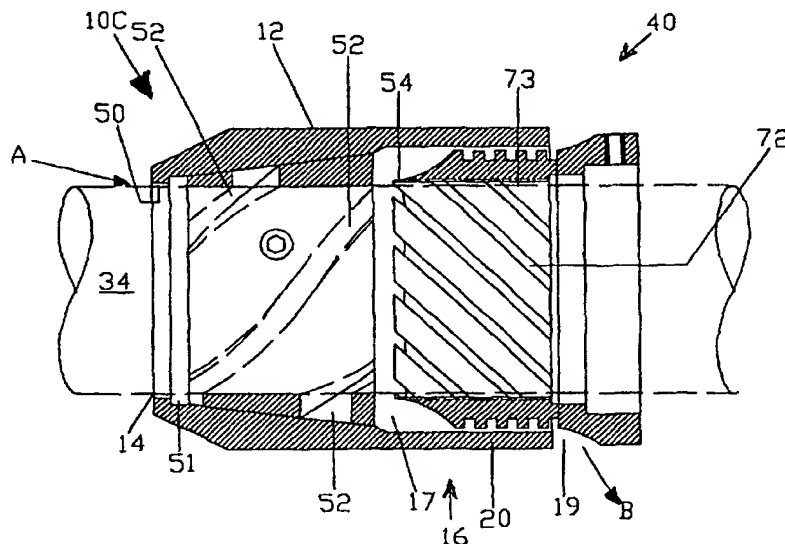
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Published

With international search report.

(54) Title: A SEPARATOR



## (57) Abstract

A separator for separating particles entrained in a fluid is disclosed. The separator includes a sleeve adapted to be mounted over a rotatable shaft for forming a cavity therebetween, an inlet to the cavity, an outlet to the cavity and means for imparting a centrifugal force on fluid within the cavity. The means for imparting the centrifugal force is operatively connected to the shaft so that, in use, spinning of the shaft creates the centrifugal force. In use, a slurry of fluid and particles enters the cavity through the inlet, the particles are caused to separate from the fluid by action of the centrifugal force, and the separated particles and fluid leave the cavity via the outlet with the particles tending to be closer to the sleeve than the shaft.

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## A SEPARATOR

### FIELD OF THE INVENTION

The present invention relates to a separator for separating particles from a fluid.

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### BACKGROUND

In many marine craft, a propeller at the end of a drive shaft extends away from the craft's stern by out rigging via a bearing. The bearing is usually cooled and lubricated by water flowing through channels or grooves which extend through the bearing. When the marine vessel passes through water where sand or grit has been disturbed, the sand/grit particles can find their way into the lubricating grooves of the bearing. These particles are highly abrasive to the bearing, and result in the bearing quickly becoming worn.

There is therefore a need to minimise the amount of sand or other abrasive particles from entering the lubricating grooves of the bearing.

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### SUMMARY OF THE INVENTION

An object of the present invention is to provide a separator for separating particles entrained in a fluid.

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In accordance with a first aspect of the present invention there is provided a separator for separating particles entrained in a fluid, said separator including:

a sleeve adapted to be mounted over a rotatable shaft for forming a cavity therebetween;

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an inlet to the cavity;

an outlet to the cavity; and

means for imparting a centrifugal force on fluid within the cavity, said means operatively connected to the shaft so that, in use, spinning of the shaft creates the centrifugal force,

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wherein, in use, a slurry of fluid and particles enters the cavity through the inlet, the particles are caused to separate from the fluid by action of the centrifugal force, the separated particles and fluid leave the cavity via the outlet with the particles tending to be

Preferably, the sleeve is arranged to rotate about its axis relative to the parting means.

Preferably, the outer layer is ejected from a first exit of the outlet. Preferably, the parting means includes a turbulence means for slowing the exit of the fluid carrying the particles  
5 from the outlet.

Preferably, the parting means is arranged to be fixed to a bearing.

Preferably, the parting means includes a scoop means for scooping the inner layer of fluid  
10 away from the blade to a second exit of the outlet.

Preferably, the scoop means is in the form of a plurality of curved channels. Preferably, the scoop means is provided with a second raceway between the curved channels and the second exit.

According to a second aspect of the present invention, there is provided a separator and parting means combination, the separating means as defined above and the parting means is arranged to portion an inner layer of fluid substantially devoid of particles from an outer layer of fluid carrying the particles.

According to a third aspect of the present invention, there is provided a separator, parting means and a bearing combination, the separator and parting means as defined above, the bearing arranged to receive the inner layer of fluid from the parting means.

## 25 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

In order to provide a better understanding, preferred embodiments of the present invention will now be described in detail, by way of example only, with reference to the accompanying diagrams in which:

Figure 1 is a cross sectional side view of a separator in accordance with the present  
30 invention;

Figure 2 is a complete cross sectional end view of the separator as would be seen from the section X-X of Figure 1;

CLAIMS

The claims defining the invention are as follows:

1. A separator for separating particles entrained in a fluid, said separator including:  
5 a sleeve adapted to be mounted over a rotatable shaft for forming a cavity therebetween;  
an inlet to the cavity;  
an outlet to the cavity; and  
means for imparting a centrifugal force on fluid within the cavity, said means  
10 operatively connected to the shaft so that, in use, spinning of the shaft creates the centrifugal force,  
wherein, in use, a slurry of fluid and particles enters the cavity through the inlet, the particles are caused to separate from the fluid by action of the centrifugal force, the separated particles and fluid leave the cavity via the outlet with the particles tending to be  
15 closer to the sleeve than the shaft.
2. A separator according to claim 1, wherein the cavity increases in cross-sectional area along its length from the inlet towards the outlet.
- 20 3. A separator according to claim 1, wherein the sleeve is frustoconical in shape with the narrow end of the cone at the inlet and a wide end at the outlet, whereby the size of the cavity increases along its length from the inlet to the outlet.
4. A separator according to claim 1, wherein said means is in the form of one or more  
25 paddles projecting from the shaft into the cavity.
5. A separator according to claim 1, wherein the inlet is of a smaller area than the outlet.
- 30 6. A separator according to claim 1, where in the cavity is of a helical shape.
7. A separator according to claim 6, wherein said helical shape of the cavity acts as

said means for imparting centrifugal force.

8. A separator according to claim 1, wherein the outlet includes a chamber at the end  
outlet of the cavity between the sleeve and the shaft, the chamber arranged to receive a  
5 parting means for portioning an inner layer of fluid substantially devoid of the particles  
from an outer layer of fluid carrying the particles.

9. A separator according to claim 1, wherein said outlet includes a parting means  
arranged to portion an inner layer of fluid substantially devoid of the particles from an  
10 outer layer of the fluid carrying the particles.

10. A separator according to claim 9, wherein the parting means is in the form of a blade  
closely encircling the shaft.

11. A separator according to claim 9, wherein the sleeve is arranged to rotate about its  
axis relative to the parting means.

12. A separator according to claim 9, wherein the outer layer is ejected from a first exit  
of the outlet.

13. A separator according to claim 12, wherein the first exit includes a turbulence means  
for slowing the exit of fluid carrying particles from the first exit.

14. A separator according to claim 9, wherein the parting means includes a scoop for  
scooping the inner layer of fluid away from an edge of the blade to a second exit of the  
25 outlet.

15. A separator according to claim 14, wherein the scoop is in the form of a plurality of  
channels in the parting means.

16. A separator according to claim 1, wherein a first raceway is provided between the  
inlet and the helical cavity.

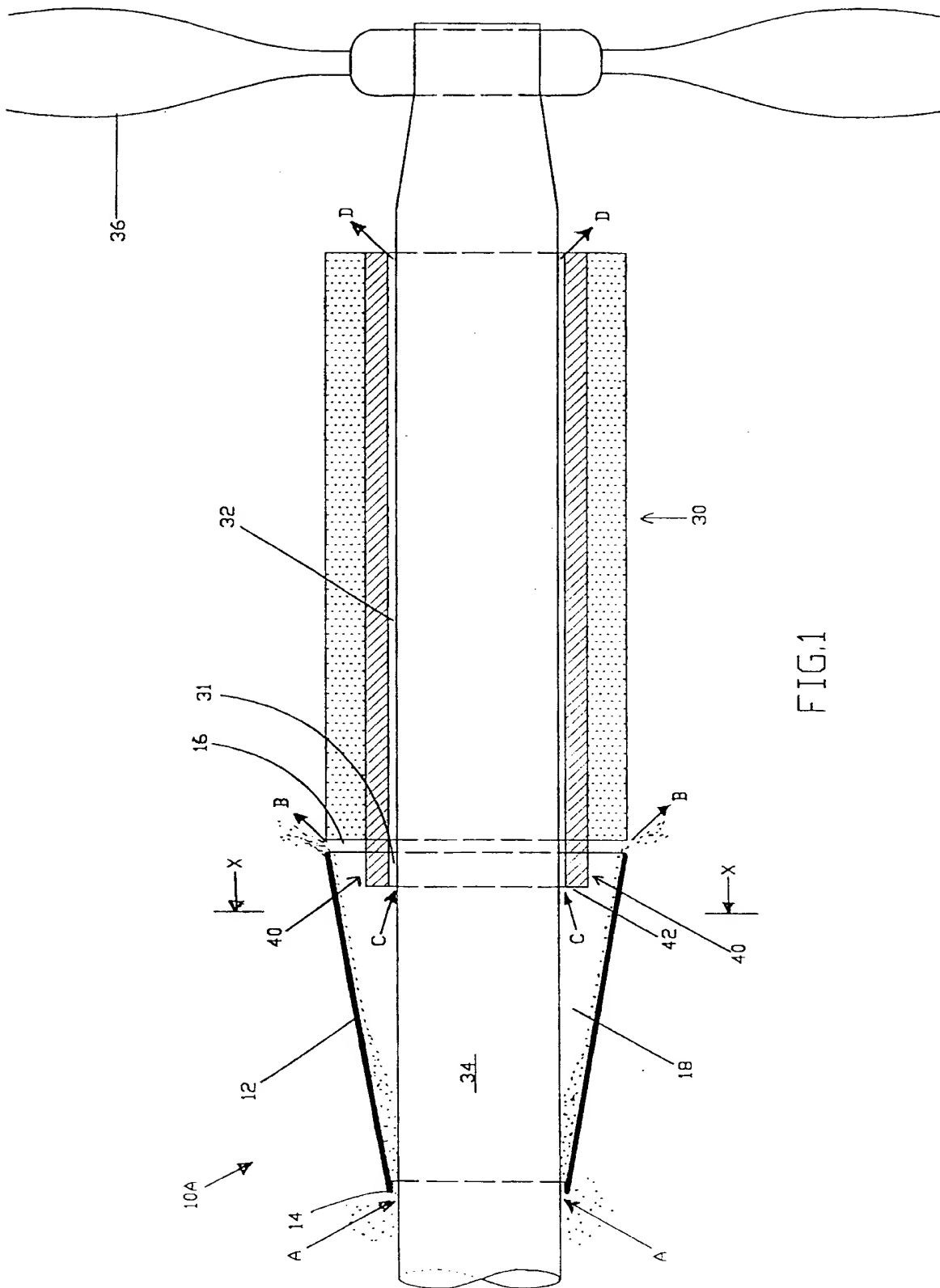
17. A separator according to claim 15, wherein a second raceway is provided between the channels in the parting means and the second exit.

5 18. A separator and portion means combination, the separator as defined in claim 1, wherein the parting means parts an inner layer of fluid substantially devoid of particles from an outer layer of fluid carrying particles.

10 19. A separator and bearing combination, the separator as defined in claim 1, the bearing arranged to receive fluid substantially devoid of particles from close to the shaft from the outlet of the separator.

15 20. A separator, parting means and a bearing combination, the separator and parting means as defined in claim 18, the bearing arranged to receive the inner layer of fluid from the parting means.

21. A separator, parting means and a bearing combination according to claim 19, wherein the bearing is provided with a sieve means on an opposite side of the bearing to the separator.





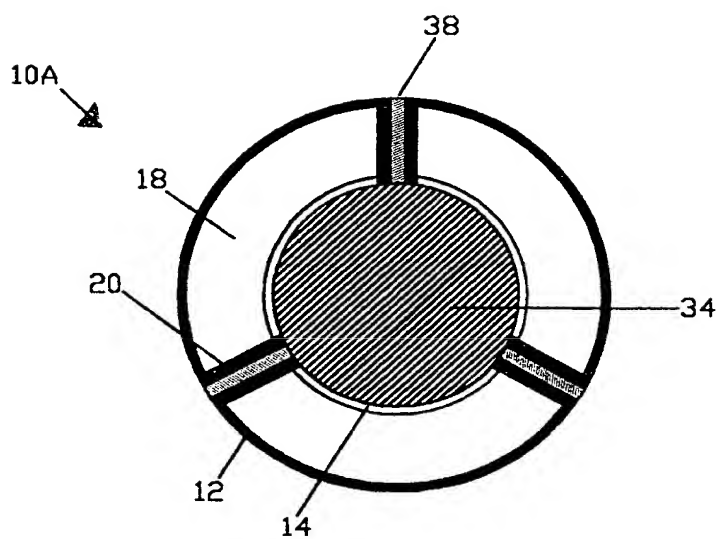


FIG. 2

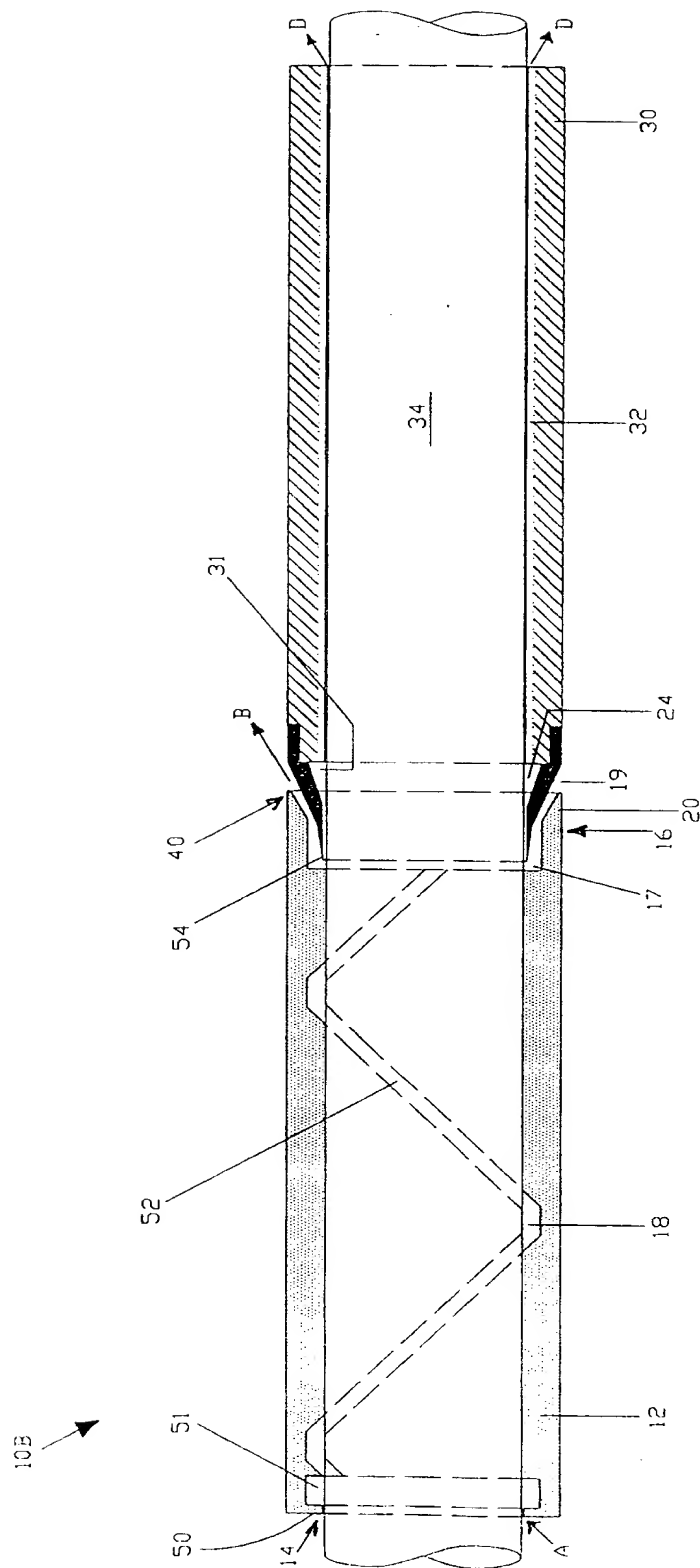


FIG. 3

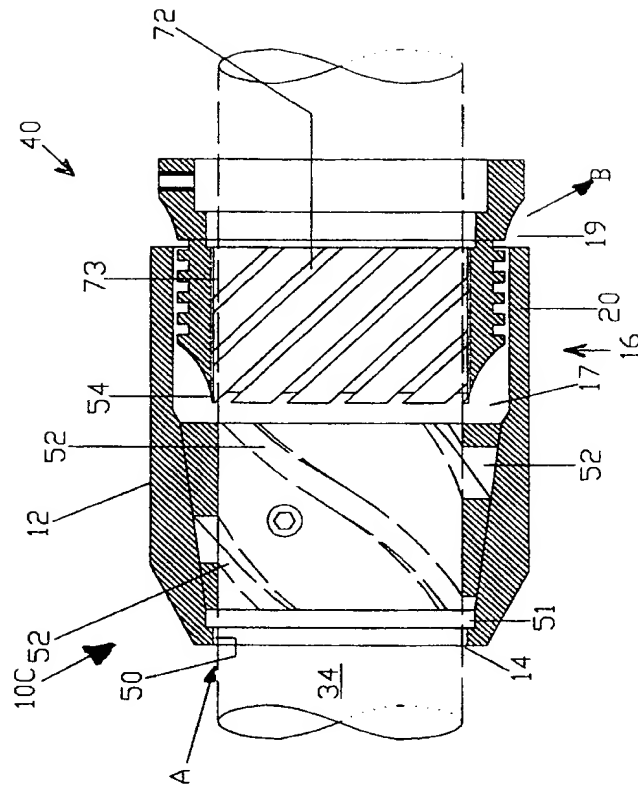


FIG. 4

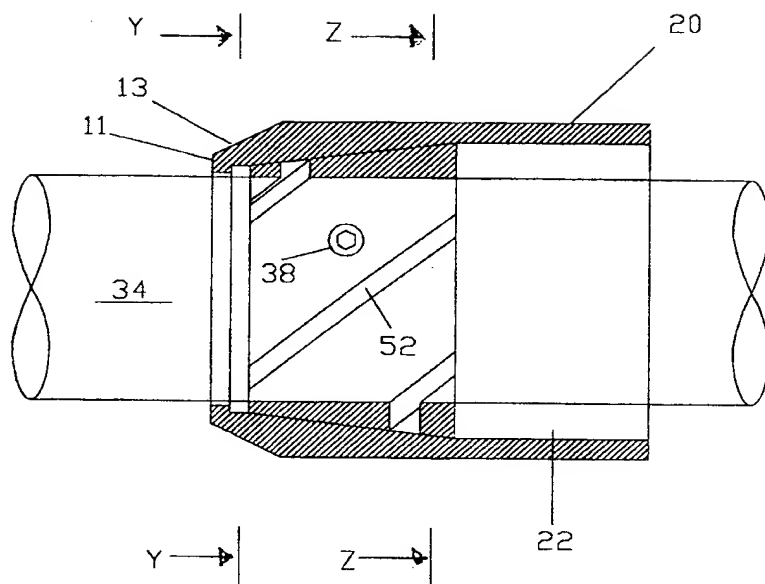


FIG. 5

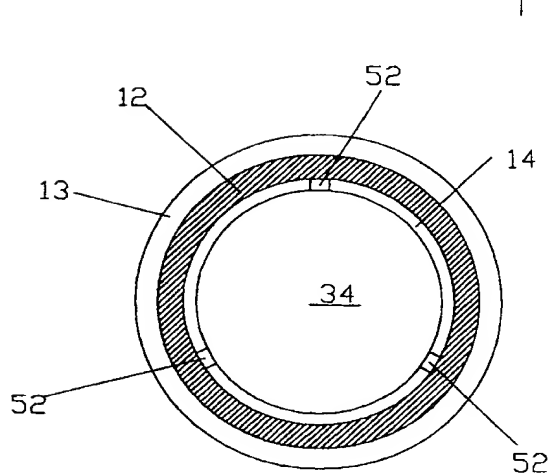


FIG. 6A

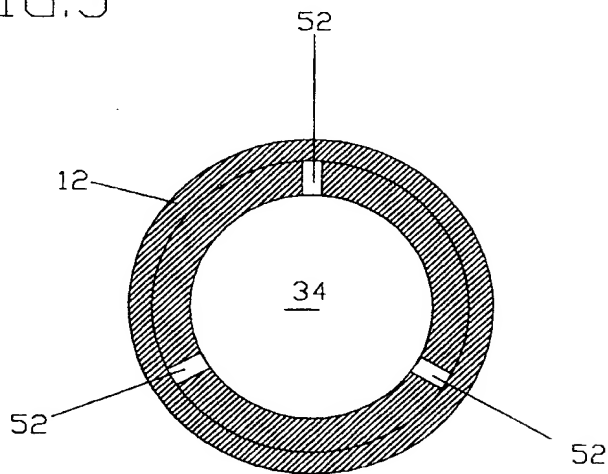
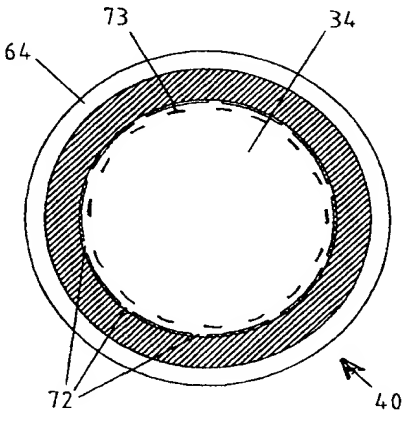
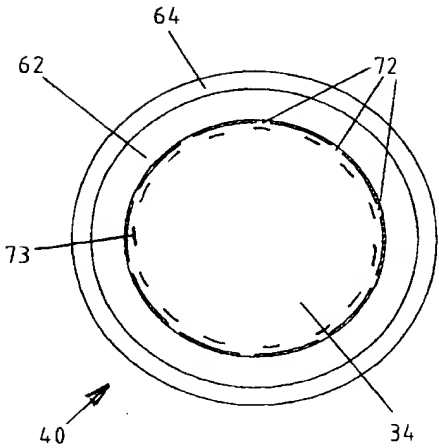
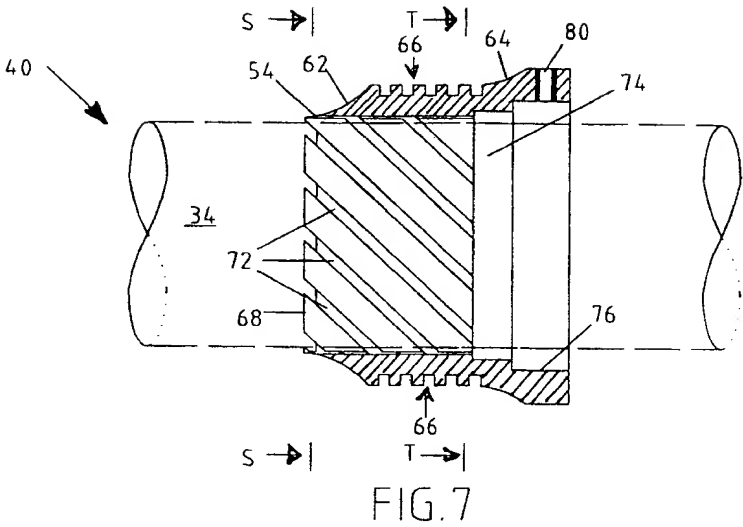


FIG. 6B



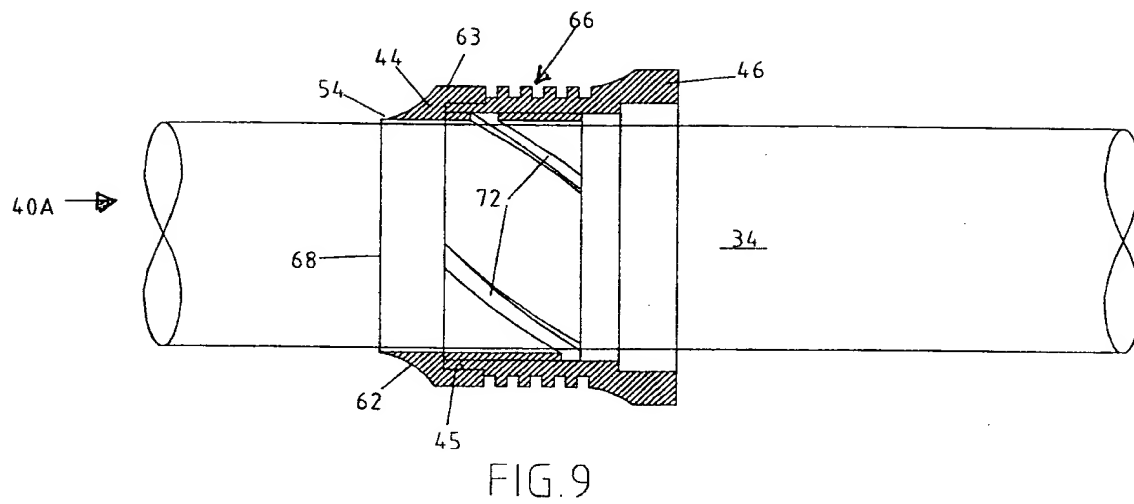


FIG. 9

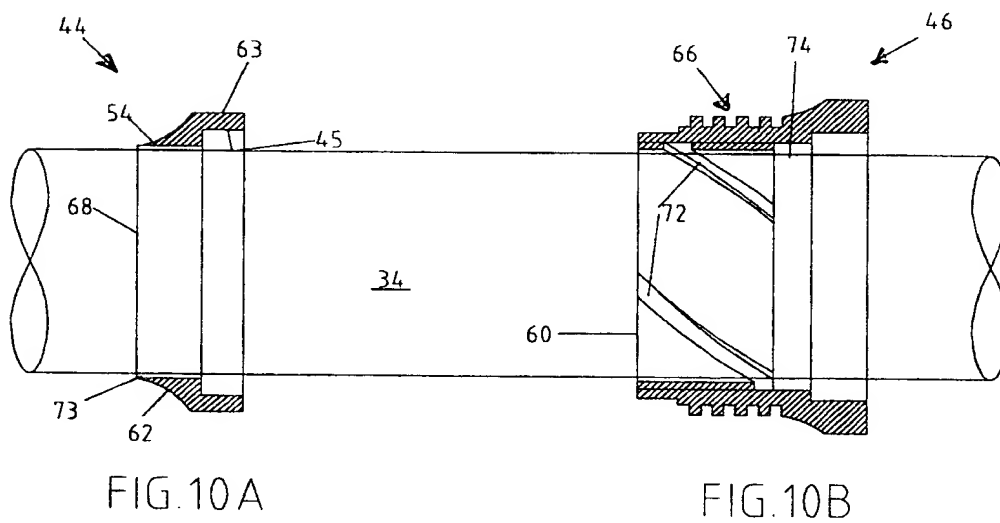


FIG. 10A

FIG. 10B

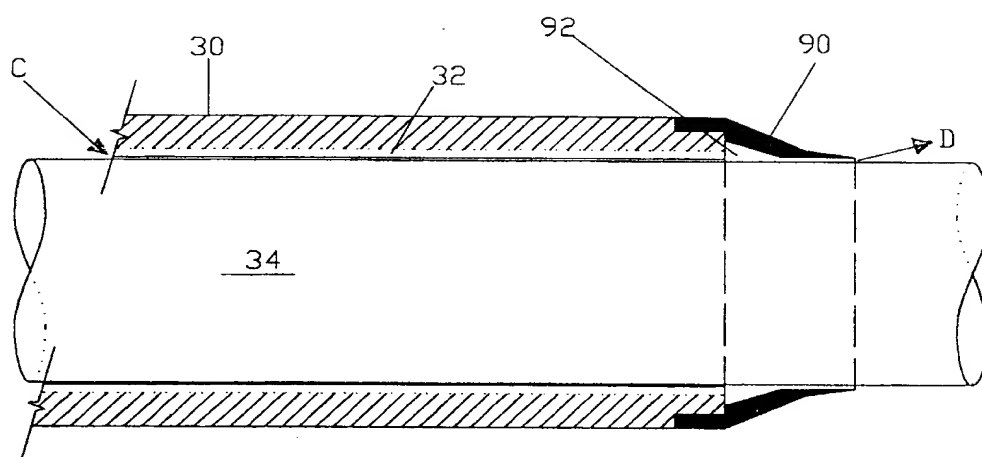


FIG.11

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU 00/00248

## A. CLASSIFICATION OF SUBJECT MATTER

Int Cl<sup>7</sup>: BO1D 21/26

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
B01D 21/26, B63H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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| X         | US 4448688 A (HAULIS)<br>15 May 1984   | 1-21                  |
| X         | WO 93/11847 A (VORTECH INTERNATIONAL INC)<br>24 June 1993                          | 1-21                  |
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